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To	Bill Potter and Rob Law, dmi		Page 1
CC	Don Kretchmer, Ryan McCarthy, Laura Kelmar, AECOM		
Subject	Proposed Plan for High Flow Event #2.		

From	Kristen Durocher	
Date	April 5, 2013	60145884.A557

As a follow-up to our phone calls with USEPA on March 18 and 25, 2013, AECOM has prepared recommendations for modifying the second High Flow Event of the small volume chemical water column monitoring (SV CWCM) program. During the first High Flow Event (February 25 through March 6, 2013), AECOM encountered significant potential health and safety hazards, particularly in two of the three freshwater tributaries (Second and Third Rivers) and logistical issues associated with synoptically sampling the entire study area (Lower Passaic River [LPR] and Newark Bay Study Area [NBSA] combined). AECOM proposes the following modifications to the tributary and Newark Bay sampling programs. There are no changes to the minimum flow criterion. The minimum flow for the second High Flow event will be based on the predicted flows at Little Falls and is 3,000 cfs as read at the Dundee Dam gaging station. This criterion was agreed upon in the final SV CWCM Quality Assurance Project Plan (QAPP).

<u>Tributaries</u>

Sampling the Second and Third Rivers during high flow conditions has several challenges. The primary concern is the health and welfare of the sampling team, who must stand in the middle of the channel with tubing held mid-depth during the duration of sampling. Collecting one sample for a full suite of analytes can take 30-90 minutes (depending on pump rates and whether or not quality control or USEPA split samples are also collected). The hazards in the tributaries include uneven substrate, rising water with high velocity, and submerged and floating debris coming downstream. The Saddle River is sampled off a bridge; no modification to the sampling plan is necessary during high flows.

AECOM originally proposed to USEPA that the analyte list be limited to the physical modeling parameters for the second High Flow Event (i.e., suspended sediment concentration [SSC], and dissolved and particulate organic carbon). This would reduce the duration of exposure of sampling staff to the rapidly rising water, and eliminate the need for ultra-clean tubing in a peristaltic pump with filters as the necessary sampling method (to reduce false positives due to atmospheric contamination). Using ultra-clean tubing and methods for sampling precludes the use of a simple “bottle dipping” method for sampling. USEPA and their modeling team disagreed with this. Therefore, AECOM needed to develop a safe means of sampling rising flood-stage waters using the existing sampling equipment.

Attachment 1 of this memorandum provides the proposed modified approach for sampling the tributaries. The method, detailed in the attachment, consists of attaching the tubing to a telescoping fiberglass pole and extending the apparatus into the tributary. Sampling will not be mid-channel or mid-depth, as specified in the QAPP, and water quality parameters collected *in situ* using a YSI may be collected from a location different than the actual sampling. Care will be taken to reach as far into the tributaries as is safe, and depth will approximate mid-depth. The sampling location will be located at the location where the tributaries are normally sampled, and the distance from the shoreline to the location will be documented. Depth will be approximated if conditions are unsafe for wading.

Newark Bay

The SV CWCM QAPP includes sampling all Newark Bay stations (East, Northeast, North, Northwest and South) four times during a High Flow Event, on a time frame coincident with the Passaic River hydrographs (predicted at Little Falls and actual time at Dundee Dam). Three rivers are part of the NBSA (the Hackensack River, Kill van Kull and Arthur Kill). Of these, the Hackensack sampling schedule is the same as Newark Bay stations, but the two Kills are sampled only twice, on a high and low tide, during the High Flow Event.

Sampling Newark Bay and the Hackensack River synoptically with the LPR provides logistical issues (additional boats, personnel and additional samples processed and shipped simultaneously). Review of the program to ensure safety of the staff and efficiency of completing another High Flow event has been conducted to determine if:

1) Sampling all Newark Bay stations is necessary.
2) All samples in the QAPP are necessary to achieve data quality objectives.
3) Sampling should be conducted dependent on the Passaic River hydrograph (i.e., do tides or freshwater inputs dominate the solids suspension during a storm event?).

Per conversation with USEPA and their modeling team, and in consultation with the CPG's modeling team, it was decided that all locations in the NBSA in the SV QAPP should be sampled. Each location was selected for a purpose and condition; and with only one event remaining, sampling each station that has been sampled in the previous six events (five Routine and one High Flow) is warranted.

During the Physical Water Column Monitoring program, flows exceeded 16,000 cubic feet per second (cfs) at Dundee Dam on March 16, 2010. Teams were mobilized, and samples were collected from locations including the lower river and Newark Bay. The SSC data collected during that event are presented on Figure 1. These data were reviewed, per USEPA request, to determine if they provide useful information to aid in the design of the High Flow sampling program in Newark Bay. The samples were collected from Newark Bay locations from late morning to early afternoon of March 16, 2010, during the time of peak flow (flow peaked at Dundee Dam at 08:15 and was sustained above 16,000 cfs from 04:30 to 20:15). SSC ranged from 19-32 mg/L (south to north in Newark Bay), which is close to concentrations observed during Routine CWCM Events (concentrations have ranged from <10 mg/L to over 30 mg/L in NBSA stations). The data collected from the March 16, 2010 sampling event do not indicate that SSC are immediately suspended during a high flow/storm event.

The CPG modeling team has provided results of a modeling exercise to determine when suspended solids, mobilized in the Passaic River, would be expected to be seen in the NBSA sampling locations. These modeling outputs are provided in Attachment 2 for spring and neap tide conditions at flows of 3,000, 4,000, 6,000, 8,000 and 10,000 cfs.

The solids signal is markedly more pronounced during spring tide conditions than during neap tide conditions. The time for the signal to reach the NBSA stations ranges from approximately 12 hours at 10,000 cfs to 27-30 hours at 3,000 cfs. Sampling Newark Bay synoptically with the LPR stations, along the rise, peak and fall of the Dundee Dam hydrograph likely misses the solids signal in the bay.

AECOM proposes the following modifications to the sampling during the next High Flow event in NBSA:

1) Sampling in the Arthur Kill and Kill Van Kull should occur on the high and low tide cycles as indicated in the QAPP. The solids signal in the Kill van Kull, in particular, appears to be more influenced by the tide cycles than the flows from the river.
2) Sampling in the Hackensack River should occur per the QAPP, on the rising, peak, and falling limbs of the Dundee Dam hydrograph. The Hackensack may have a slightly different peak flow timing than the Passaic River, but the information provided by sampling synoptically with the Passaic River will provide information regarding inputs to Newark Bay.
3) Sampling at the Newark Bay locations (North, Northeast, Northwest, South and East) should be delayed, as provided in Attachment 2, such that the anticipated response from the solids signal is captured. The length of this delay depends on the peak flows at Dundee Dam, and will most likely be approximately 24 hours from peak at Dundee. Sampling in Newark Bay would therefore commence after peak flow sampling in the River, and before the falling limb samples are collected from the River. This will allow AECOM to reduce the number of teams sampling simultaneously in the study area. This also addresses the concern raised by USEPA that USEPA oversight teams need more time, if possible, and provides this additional lead time to the USEPA oversight teams in Newark Bay.

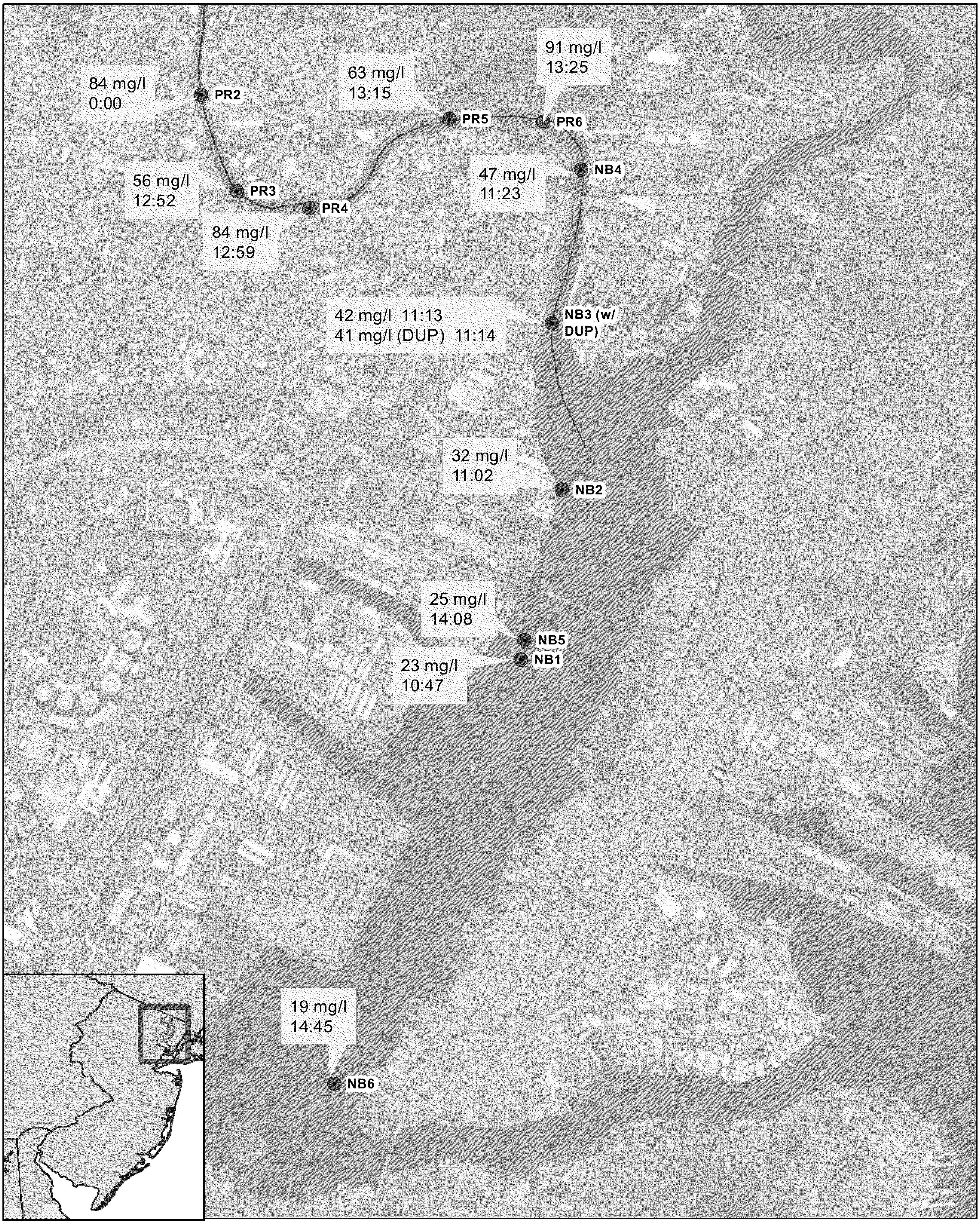

Figure 1. Suspended Sediment Concentrations March 16, 2010 10:47 - 14:25

● PWCM Location

Peak flow at Dundee Dam 16,300 cfs March 16, 2010 at 08:15. Flows >16,000 cfs from 04:30 20:15

AECOM

March 2012

Orthophotos: © 2009 ESRI, i-cubed, GeoEye

Coordinate System: NJ State Plane, Feet

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Figure 1. Spring Tide; Tracer Time-Series at Different Locations with 3 ,000 cfs River Discharge at Dundee Dam

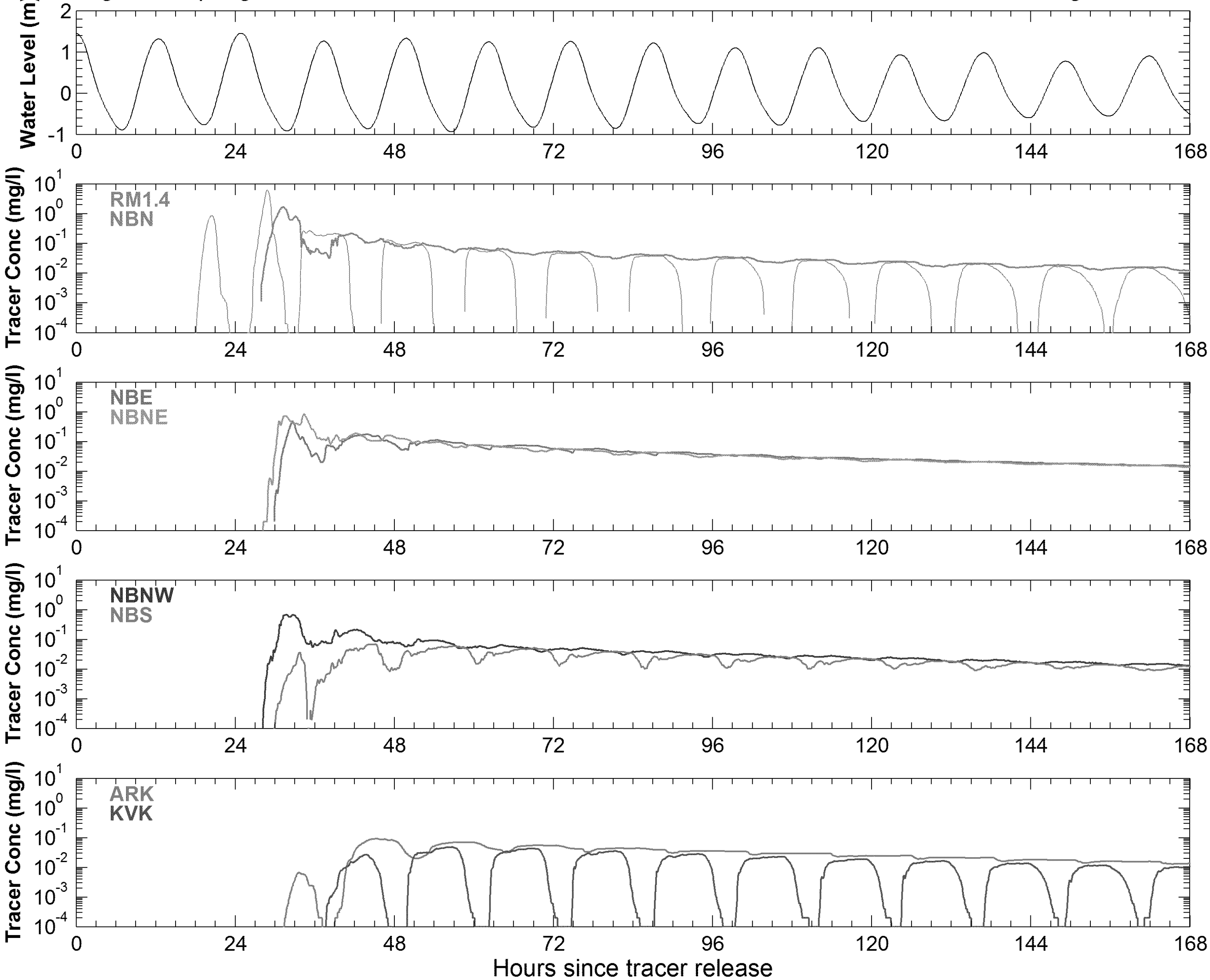

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Figure 2. Spring Tide; Tracer Time-Series at Different Locations with 4 ,000 cfs River Discharge at Dundee Dam

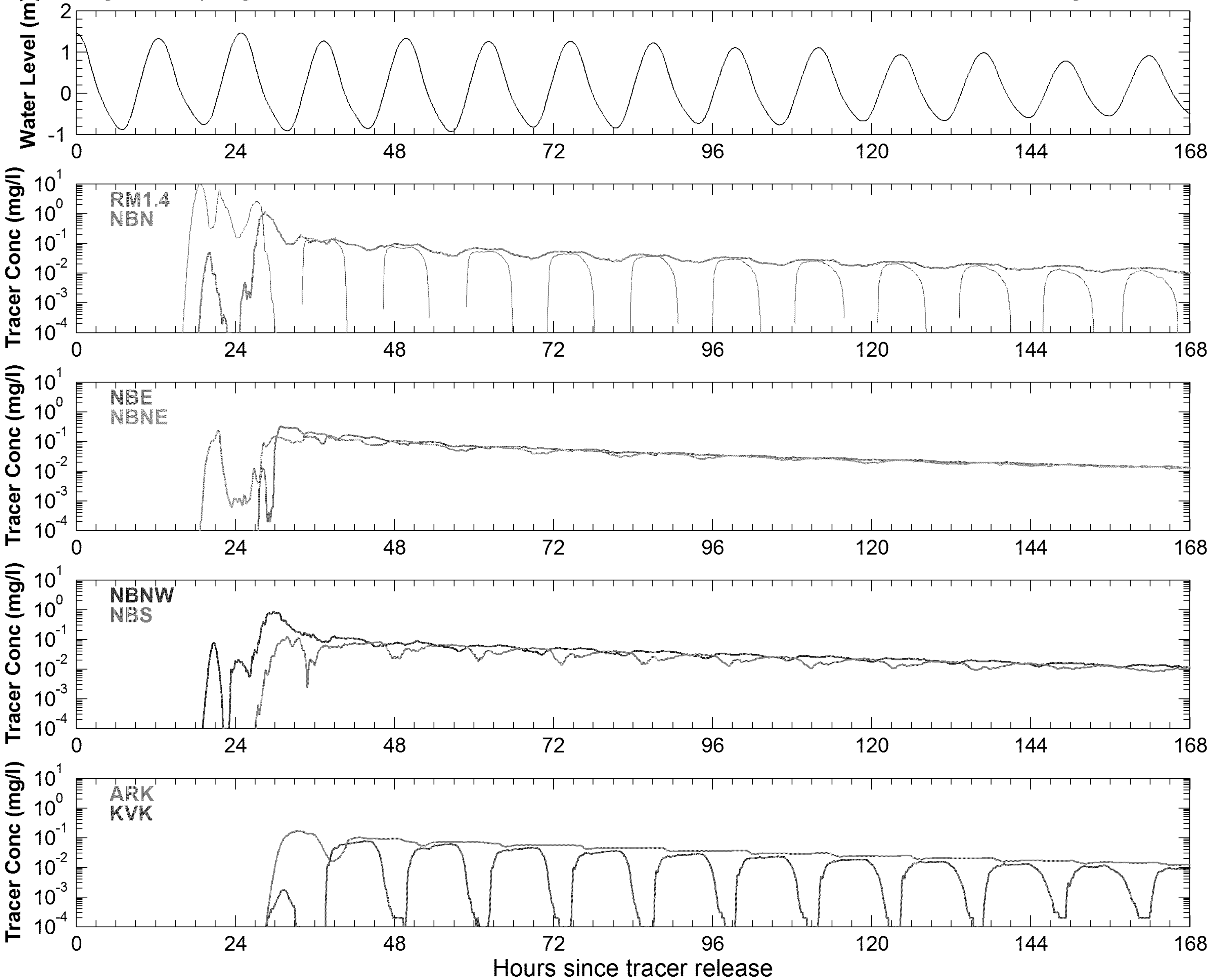

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Figure 3. Spring Tide; Tracer Time-Series at Different Locations with 6 ,000 cfs River Discharge at Dundee Dam

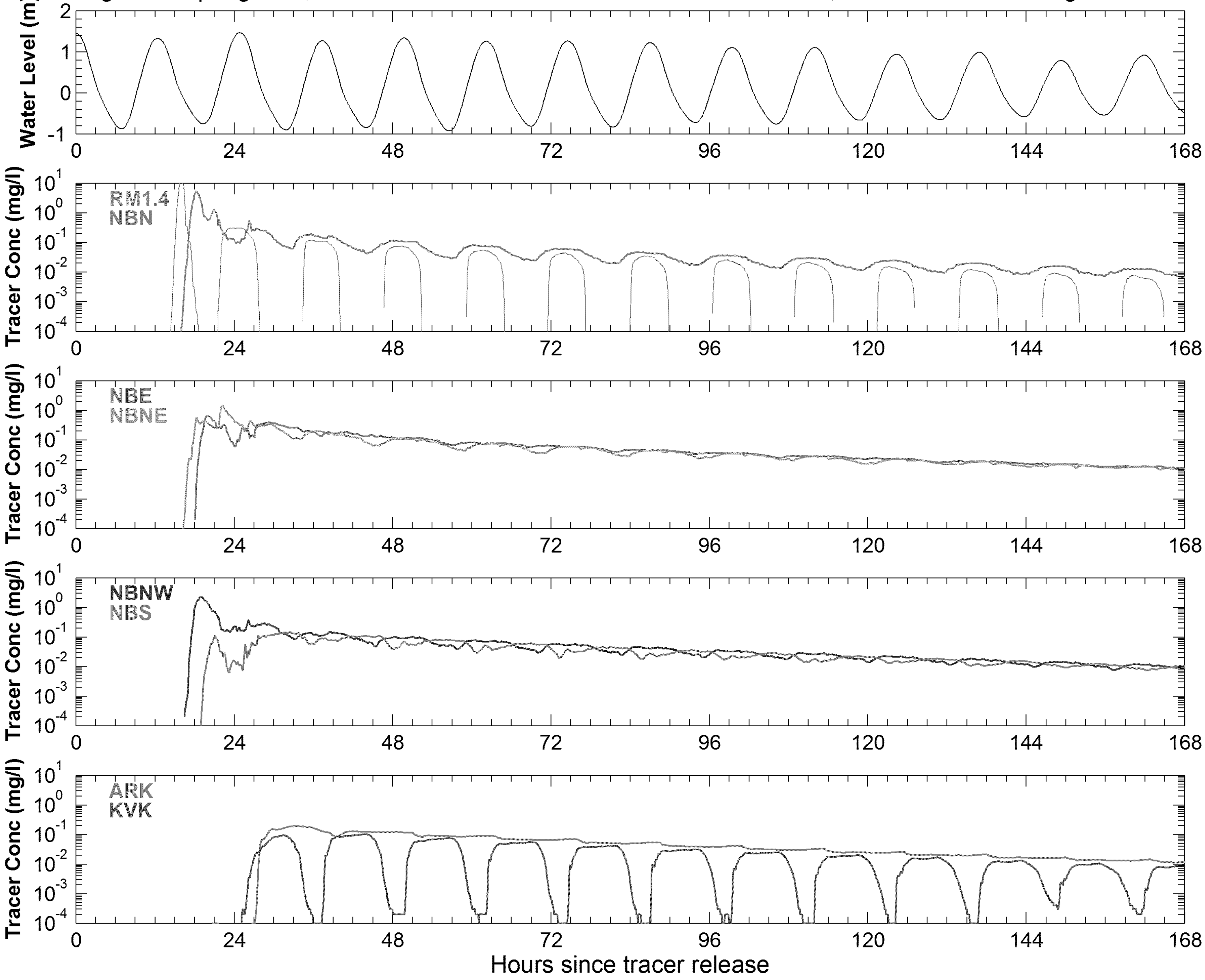

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Figure 4. Spring Tide; Tracer Time-Series at Different Locations with 8 ,000 cfs River Discharge at Dundee Dam

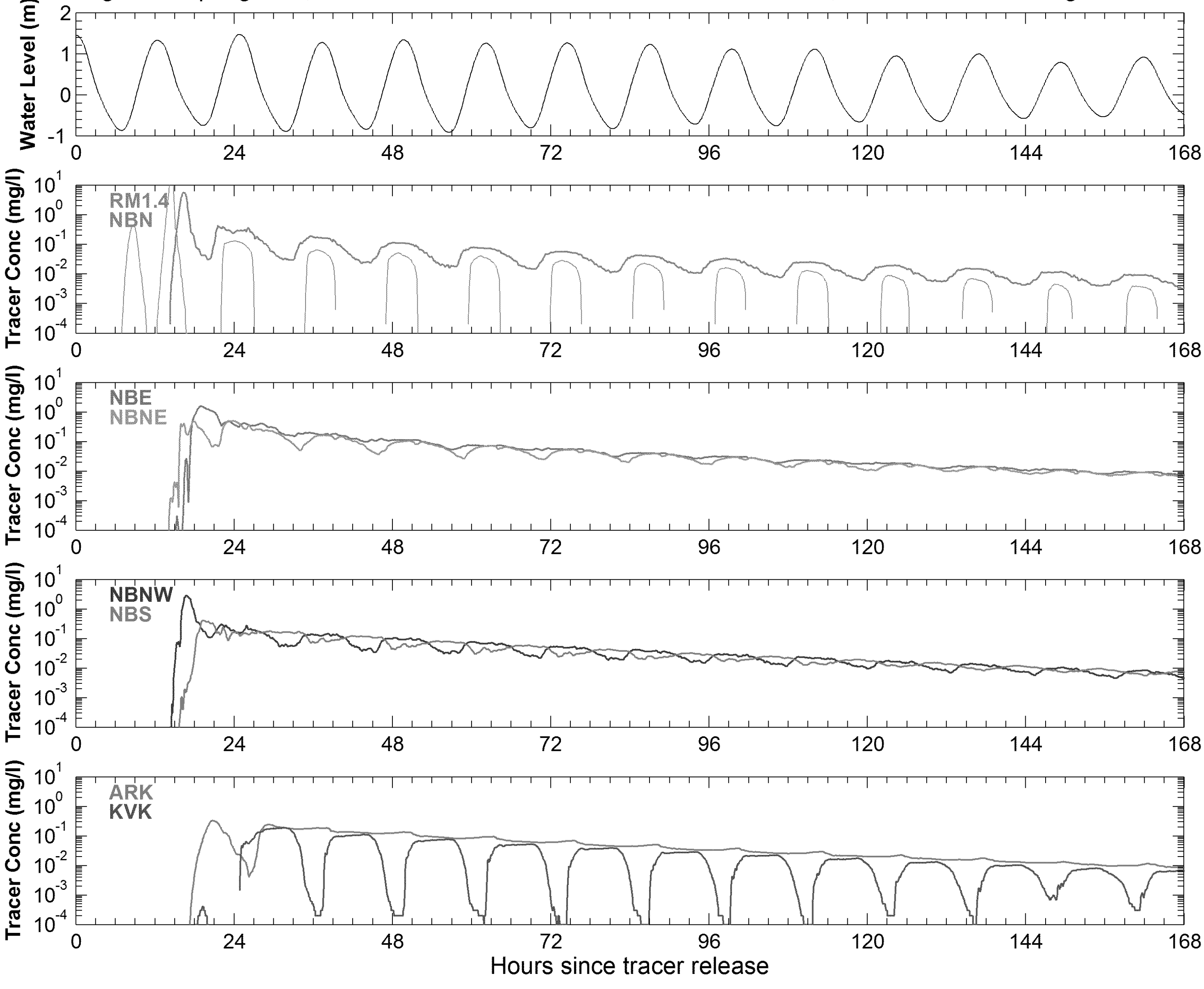

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Figure 5. Spring Tide; Tracer Time-Series at Different Locations with 10 ,000 cfs River Discharge at Dundee Dam

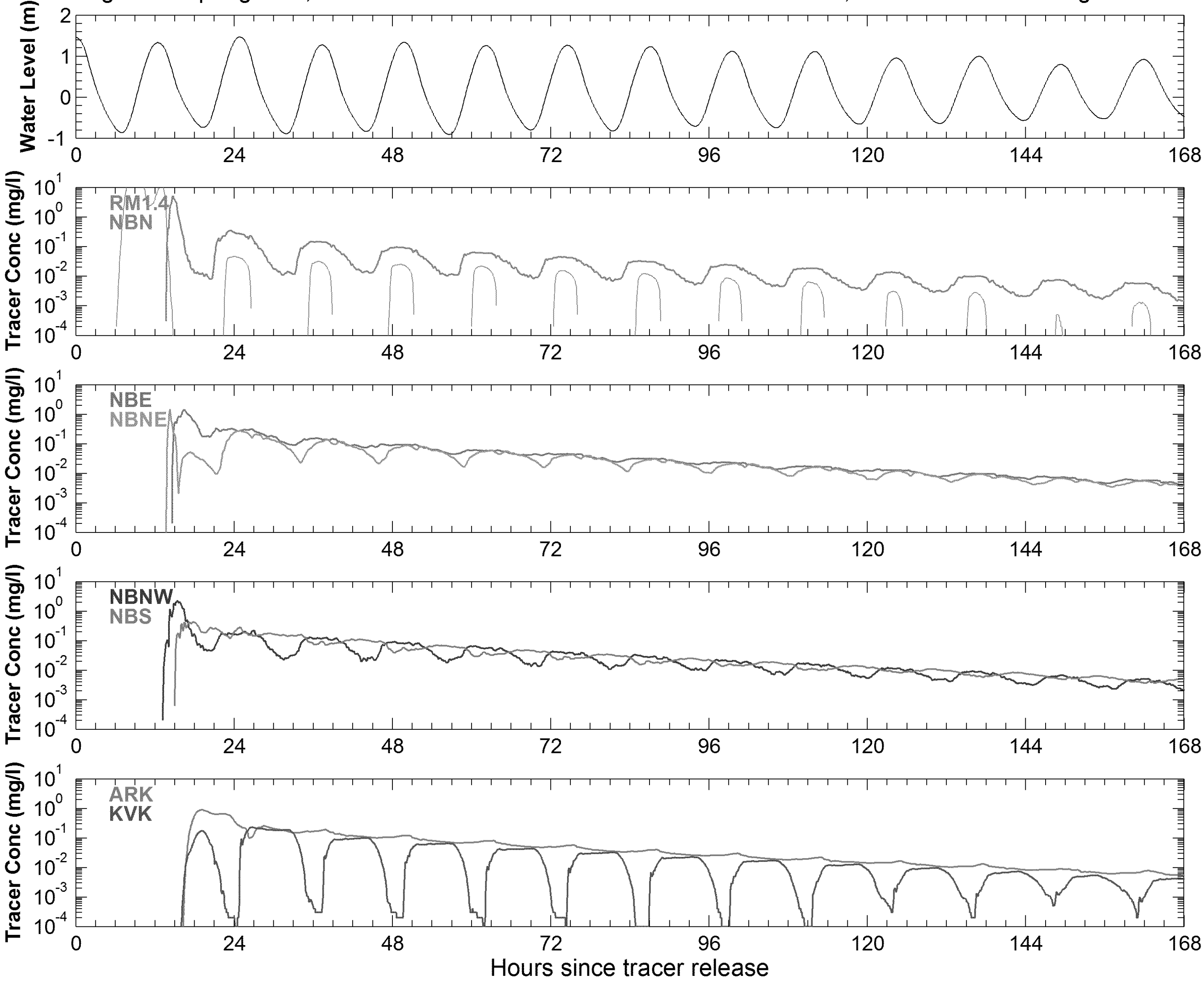

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Figure 6. Neap Tide; Tracer Time-Series at Different Locations with 3 ,000 cfs River Discharge at Dundee Dam

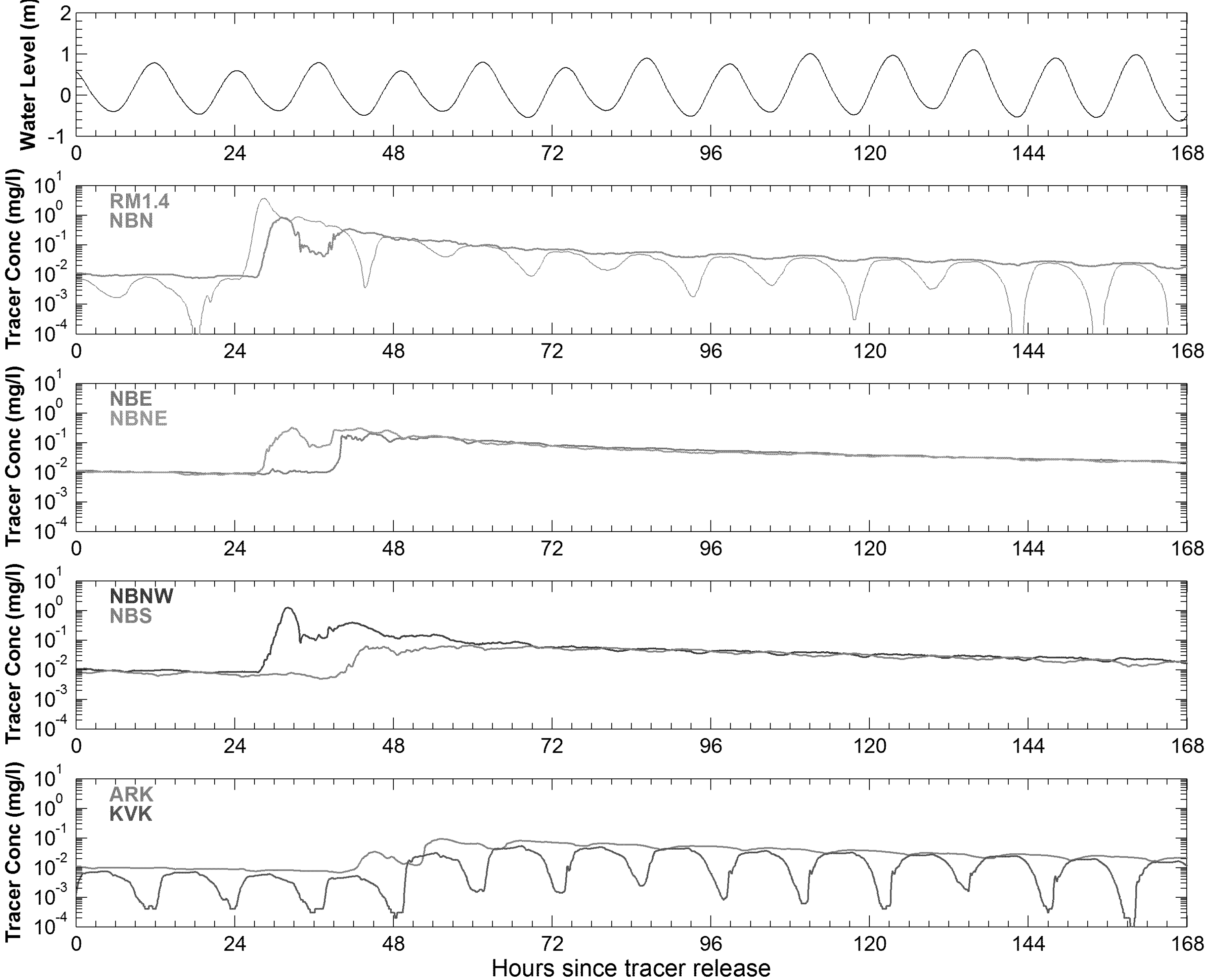

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Figure 7. Neap Tide; Tracer Time-Series at Different Locations with 4 ,000 cfs River Discharge at Dundee Dam

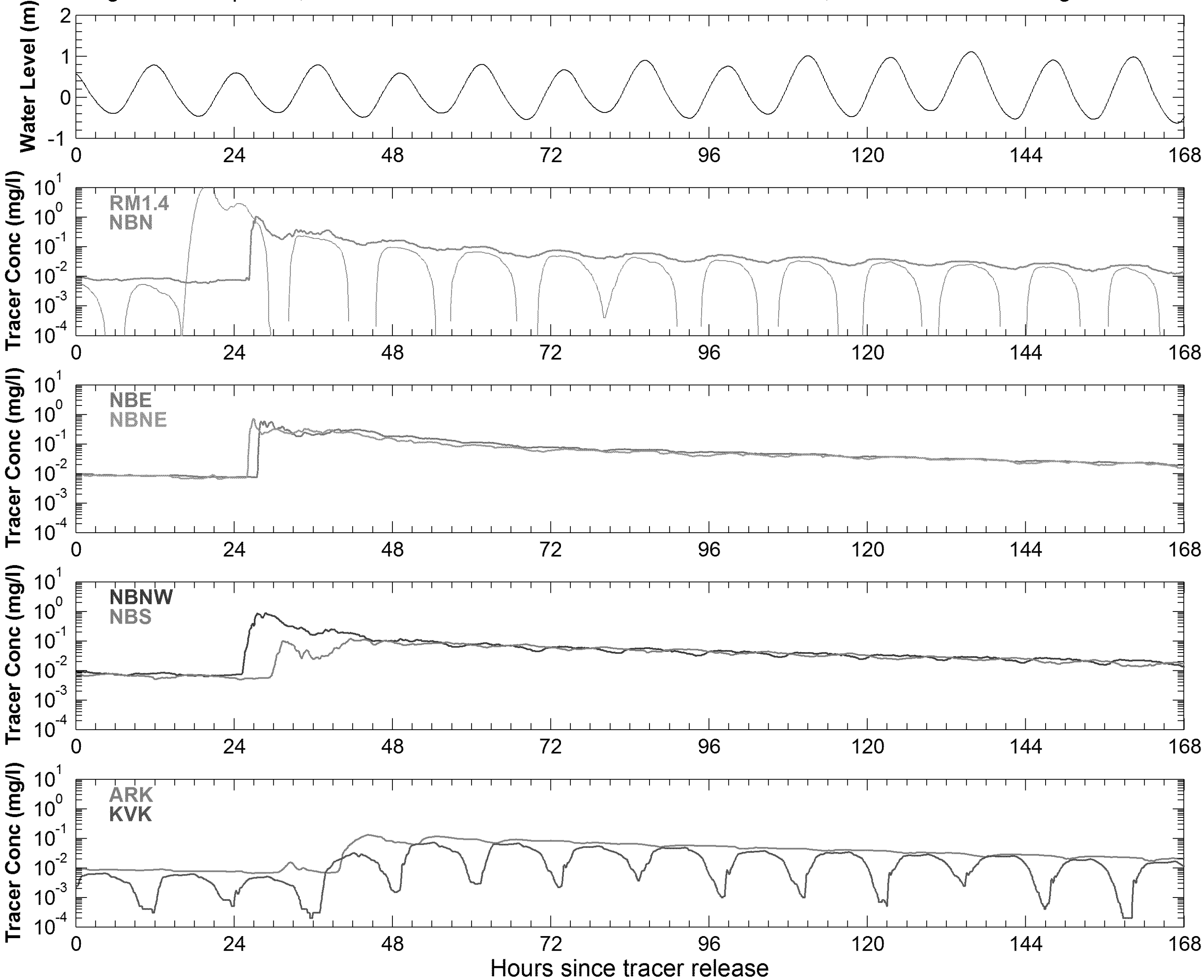

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Figure 8. Neap Tide; Tracer Time-Series at Different Locations with 6 ,000 cfs River Discharge at Dundee Dam

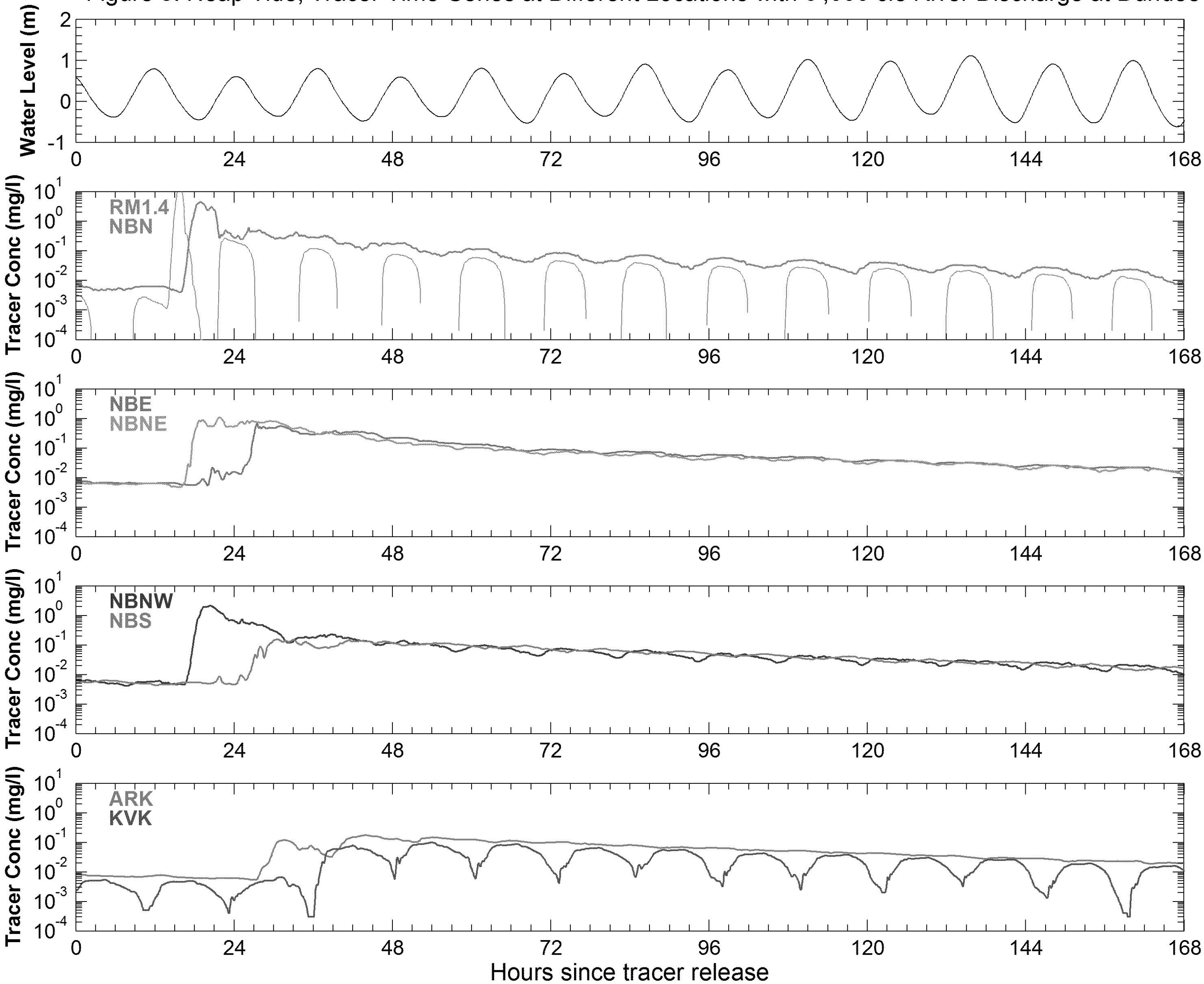

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Figure 9. Neap Tide; Tracer Time-Series at Different Locations with 8,000 cfs River Discharge at Dundee Dam

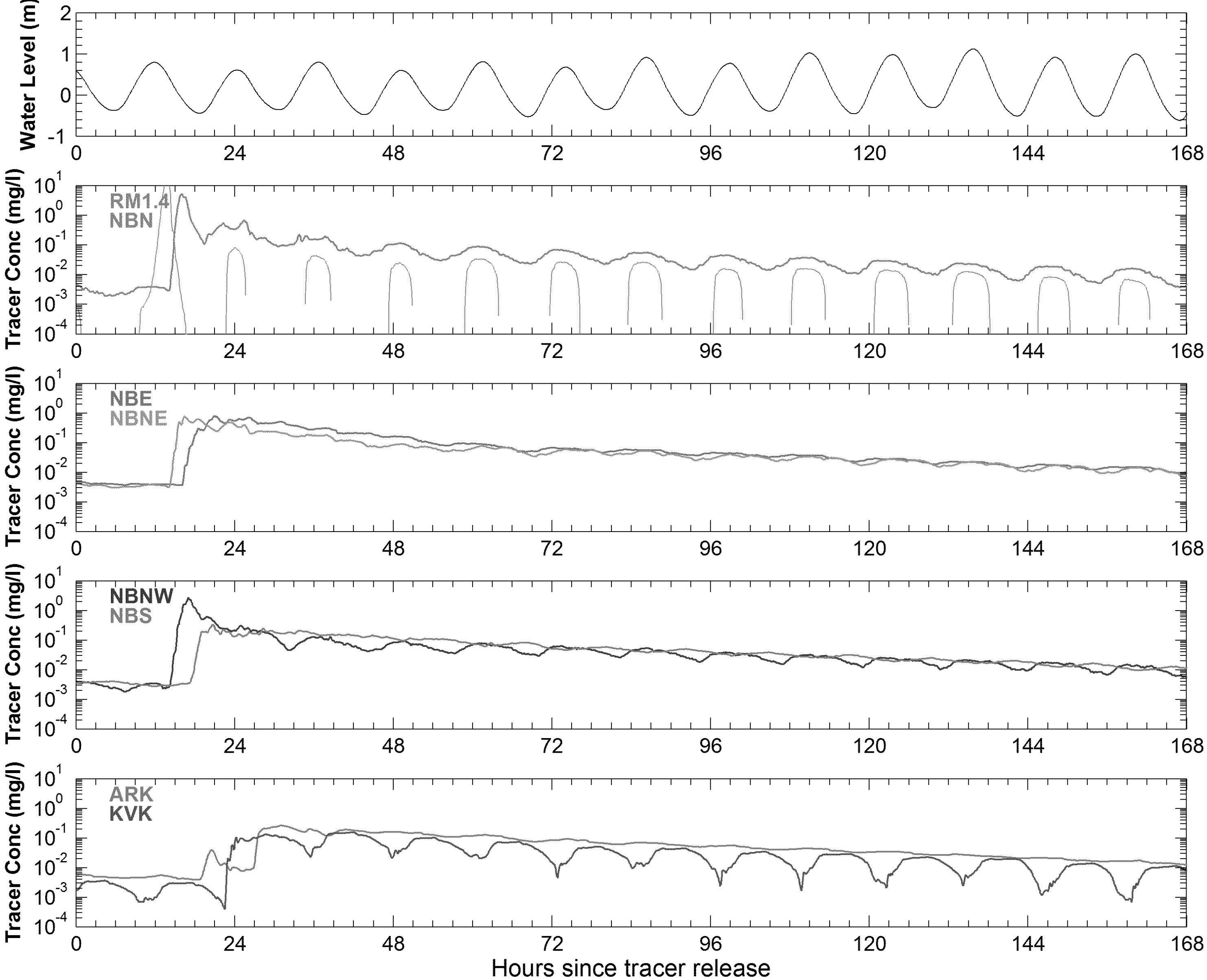

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Figure 10. Neap Tide; Tracer Time-Series at Different Locations with 10,000 cfs River Discharge at Dundee Dam